

Home Application Control through Face Detection by Image Processing

Pratik Tarale

UG Student

Department of Electronic and Telecommunication

Engineering

*Prof.Ram Meghe College of Engineering and Management,
Badnera, India*

Rohit Ingle

UG Student

Department of Electronic and Telecommunication

Engineering

*Prof.Ram Meghe College of Engineering and Management,
Badnera, India*

Prof. L. S. Kalkonde

Assistant Professor

Department of Electronic and Telecommunication Engineering

Prof.Ram Meghe College of Engineering and Management, Badnera, India

Abstract

Now a days the number of thefts and identity fraud has become a serious issue. In order to avoid these thefts and identity fraud, a face recognition system must be established. The scope of this project is to develop a security access control application based on face recognition. The hair-like features is used for face detection and PCA algorithm is used for face recognition. In order to achieve a higher accuracy and effectiveness we use Arduino and python computer language. Training and identification is done in embedded device known as Raspberry Pi. During our paper we focus on accuracy increment by controlling parameters such as background, light and number of trainings. During our paper we also explicate cost issues of our application compared with commercial applications.

Keywords: Night Camera, Raspberry Pi, PCA

I. INTRODUCTION

Face recognition systems have been conducted now for almost 50 years. Face recognition is one of the researches in area pattern recognition & computer vision due to its numerous practical applications in the area of biometrics, Information security, access control, law enforcement, smart cards and surveillance system. The first large scale application of face recognition was carried out in Florida.

Electricity has become the fundamental requirement of human life. Our businesses, day to day life, communication, etc. all of it depends on electricity. But in towards world of fast depleting natural resources like coal, we need to find effective ways to conserve electricity or else we shall see a major shortage in the future. The problem at hand is that in public buildings like offices, colleges, schools, etc. often people leave the lights and fans on when they leave the rooms. We intend to design a power management system which will sense if the room is vacant and accordingly turn the lights off.. The need to conserve electricity has grown at a dizzy pace stemming from the need to save the fast depleting natural resources required to generate electricity. Electricity is a basic requirement for any business to flourish and to keep the cost on electricity at a minimum any wastage has to be avoided

II. SYSTEM ARCHITECTURE

A. Objective

System is to design cost effective and open source home automation system which can be generalized for various home and outdoor environments. The system provides great flexibility by connecting all modules to system this in turn reduces development cost and adds flexibility of features and system configuration. Proposed system make use of wired connection between camera, raspberry pi and appliances .The important reason to develop this system is to save time and man power along with maintaining security and convenience.

Camera is low cost image capturing unit that we can apply at home. It gets triggered when image is detected. When it captures image, it sends coordinates to raspberry pi through wired connection. Raspberry pi processes the input coordinate and an extra feature that enhances the security of the system by using sensor for intrusion detection.

B. Working

The main purpose of given system is that controlling and monitoring electrical application without any human intervention. For performing such task it mainly consist of three elements which are Camera, Raspberry pi, Relay etc.

Working of given system elaborated below

When any living thing is entering in room then camera is getting trigger after detection of image. After detection it capture the image and once it capture it send coordinate to Raspberry pi through wired connection.

Raspberry pi receive signal from camera. After receiving input signal it processes that input signal through different processes. For example feature of receiving image is compare with standard image. After processing the input Raspberry pi send signal to the Relay through GPIO pin. Where GPIO is having 40 pin either it is use as input or output. In this system GPIO is used as output pin and which carry the signal send by the Raspberry pi.

Relay is electrically operated switch which receives signal from Raspberry pi act as the close switch. As relay is act as the close switch it turns ON/OFF the load.

In the system total detection is based on python programming and which run on Raspberry pi. Raspberry pi is act as the controlling element.

III. SYSTEM COMPONENTS

A. Camera

Camera is low cost image capturing unit that we can apply at home. It gets triggered when image is detected. When it captures image, it sends coordinates to raspberry pi through wired connection. A camera is used in this system which plays an important role in face detection and face recognition.



Fig. 1: Camera

B. Raspberry Pi

The Raspberry Pi is a low cost, credit card sized single board computer developed by raspberry pi foundation. Raspberry pi is controlled by a modified version of Debian Linux optimized for the ARM architecture. Here we are using model B plus. The Raspberry Pi has a Broadcom BCM2837 system on a chip (SoC), which includes an ARM Cortex-A53 processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. Raspberry pi as a controller use for control digital device. It is 40pin I/O GPIO. In Raspberry pi 3 has 4 USB port, Wi-Fi antenna, Camera module, micro SD port, HDMI PORT. Raspberry pi3 has updated version than raspberry pi 2 module. .The raspberry pi may be operated with any generic USB computer keyboard and mouse. It may also be used with USB storage, USB to MIDI converters, and virtually any other device/component with USB capabilities. Other peripherals can be attached through the various pins and connectors on the surface of the Raspberry pi.

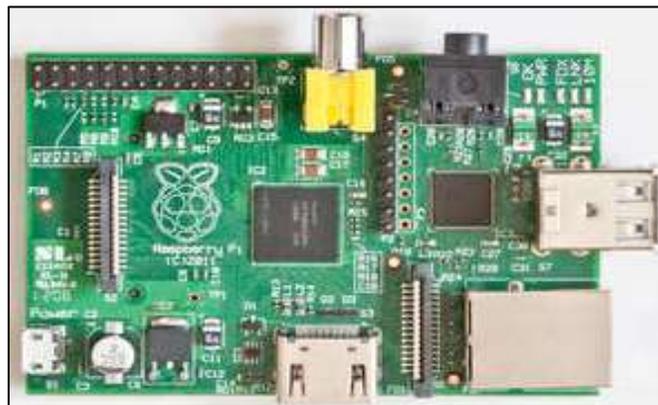


Fig. 2: Raspberry Pi Module

C. Relay

A relay is an electrically operated switch. It allows one circuit to switch a second circuit which is completely separated from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits, the link is magnetic mechanical.



Fig. 3: Relay

IV. FUTURE SCOPE

The main drawback with this system is that, it can be used only for the places whose orientation or arrangement of seats never changes. But we can overcome this by resetting the reference images whenever the arrangement is altered. The main program needs not to be altered. Another way of overcoming this limitation is using the face detection techniques. It is expected to give much flexibility and simplicity to the overall system.

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